Addressing Changing Needs for Climate Information

Certified Public Manager Project

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I. Introduction and Problem Statement

Created in 1986, the Office of State Climatology (SCO), as mandated by the South Carolina General Assembly Section 49-25-10 et seq., Code of Laws of South Carolina, 1976, provides a unique service to the state by archiving and distributing climate and meteorological data, reports, and research that date back to the late 1800s. The past few decades have seen a series of scientific advances and technological changes that have vastly enhanced the amount and distribution of climate information in South Carolina and nationally. Advances in monitoring and predicting variations in climate, coupled with growing concern over the potential for climate change and its impact, have broadened the scope and importance of how climate data and services are utilized (A Climate Services Vision: First Steps Toward the Future, 2001; Changnon, 2008).

In support of the National Climate Assessment, there is an effort locally and nationally to conduct "Climate Service Assessments" to better identify stakeholder needs and knowledge gaps (Dow, K. et al., 2010). Climate service assessments can help identify how organizations are using climate data, their risks to climate variability, whether they are planning for "climate change" and their adaptive capacity. There were two primary objectives for this Certified Program Manager project:

1.) Develop and implement a systematic procedure to identify and document the nature and scope of requests received by the South Carolina State Climatology Office. (SCO). The project engaged SCO customers to determine how they are integrating climate information into their day-to-day operations as well as their long-term plans.
2.) Develop a process and inventory to evaluate resources (data, training, models, research, etc.) available within the South Carolina Department of Natural Resources

to enhance the agency's climate impact assessment. This component will directly benefit the South Carolina Department of Natural Resources (SCDNR) in the process of completing a document entitled "Climate Change Impacts to Natural Resources in South Carolina" and implementing agency priorities to address climate change.

The data, methodology, data collection, data analysis, implementation, evaluation, summary and conclusions are presented in five sections. The two components of the CPM project are discussed separately within each section. Section II discusses the data collection methodology and provides background on how the project aligns with the agency's needs and goals. Section III provides an analysis of the data. Section IV addresses action steps completed, potential obstacles and goals for implementation into long-term operating procedures. Section V summarizes key findings and recommendations for future action.

II. Data Collection and Methodology

Climate Service Survey

This section will discuss the data collection methodology utilized for the client assessment survey and will demonstrate how the project implements a new office process. The SCO receives 40-50 requests a month for climate and weather information. There have been attempts in the past to document climate requests, but previous efforts were limited in the range of information collected including only the name, address, organization and whether there was a charge to process the request. No user documentation has been collected in the past four years. The total number of requests received has decreased due to the increased number of climate resources available online. However, without a systematic process to document user requests it has been difficult to evaluate whether customer needs are changing and to determine ways to improve our customer response.

The primary objective for component one of this CPM project was to develop and implement a systematic procedure to identify and document the nature and scope of requests received by the SCO. The project surveyed SCO customers to determine how they integrate climate information into their day-to-day operations as well as their long-term plans. Requests were coded to determine the types of information needed; the range of individuals and sectors requesting information; differences in the specificity of information needs; the climate sensitive decisions being made; and the capacity of the SCO to meet the user needs. The survey developed for this CPM project is included in Appendix I. The survey contains three components; collecting information about the user's background, the climate sensitive decision needs and capacity for utilizing the data, and the user's current or anticipated need for climate variability and climate change projections.

The survey questions were developed in conjunction with a broader effort by State Climatologists in the Southeast region (Alabama, Florida, Georgia, North Carolina, South Carolina, Puerto Rico and Virginia) and the Southeast Regional Climate Center to conduct client assessments. The NOAA Carolina's Regional Integrated Science Assessment (CISA) team provided guidance and funding support for the regional project (funding to SCDNR provided by NOAA CISA Regional Assessment Subaward, 2011). Developing this shared database of requests will help identify stakeholder needs and knowledge gaps in the region.

The data for the CPM project were collected for the period September 15, 2010, through March 31, 2011. The survey responses and analysis were completed in Microsoft Excel. A secure online application/database developed by the North Carolina State Climatology Office through funding from the NOAA CISA Regional Assessment grant will be utilized in the future by State Climatologists in the Southeast region to document requests (http://sercc.com/clients/).

Early implementation of the survey by the SCO proved to be beneficial in developing the full-scale regional effort since we were able to identify ways to improve the questions and achieve consistency among staff conducting the survey. This will be discussed in more detail in the final section.

SCDNR Climate Change Impact's to Natural Resources Document Management System

The second component of this section addresses the data collection methodology and justification for implementation of the SCDNR Climate Change Impacts to Natural Resources Document Management System (CCDMS). This CPM component focused on developing a process to evaluate resources (data, models, research, etc.) available within the S.C. Department of Natural Resources (SCDNR) to enhance the agency's climate change impact assessment, response and adaptation. Serving as chair of the SCDNR Climate Change Technical Working Group I realized the need for a system to track and store resources that would benefit the SCDNR in our effort to complete the agency's report, "Climate Change Impacts to Natural Resources in South Carolina" and to implement agency priorities to address climate change. Climate change information related to natural resources was being stored and exchanged, but in an unmanaged and decentralized way through scattered file shares, emails and on individual hard disk drives. Thus, it was difficult for staff to find, share and collaborate effectively on the issue.

Meetings were held with the SCDNR Climate Change Technical Working Group (SCDNR-CCTWG) and the SCDNR Technology Development Section to identify the optimal application that would allow staff to enter data, determine grant opportunities, research, models, training and decision-support tools available within the agency to address climate change. The consensus was that an online document management system was the most advantageous option.

The document management system would allow staff to store, organize and locate documents, ensure document consistency and manage metadata.

III. Data Analysis

Climate Service Survey

This section of the CPM project discusses the survey data retrieved from the client assessment survey. Three SCO staff completed surveys for 190 customer requests received during the period September 15, 2010, through March 31, 2011. The ratio of customers surveyed compared to total customer requests received was 62%. This ratio was lower than originally anticipated, but should improve once the online tool becomes available and SCO staff become more familiar and comfortable with the process. Staff documented that 15% of requestors not surveyed seemed reluctant responding to questions so the interview was terminated at the staff member's discretion. The purpose of the survey is to improve customer service not cause customer frustration or dissatisfaction. Staff were sometimes reluctant to conduct a user survey when the request was answered in less than two minutes by providing readily available information (i.e. online National Weather Service forecasts).

The 190 customer assessments completed provide valuable information about the stakeholder type, climate sensitive decision needs, capacity for utilizing the data and the users' level of planning for future climate variability. Question six reveals that the majority of the clients found out about our service from a referral (n=62) or the website (n=63). Twenty-six were return customers, 31 were not documented and only eight had to search for our service.

Figure 1 shows the number of customers from the different stakeholder groups. The survey assessments indicate twenty-seven percent of our requests are from government agencies (3 from federal, 14 from local, 35 from State). The next largest user group is from

Legal/Insurance, accounting for 16% of our requests. A similar number of requests are from agriculture, construction, utilities and media (~ 5 % from each). Thirteen percent of the calls were left blank or documented from unknown sources. Staff should be encouraged to lower this percentage and document appropriately the type of organization requesting climate information.

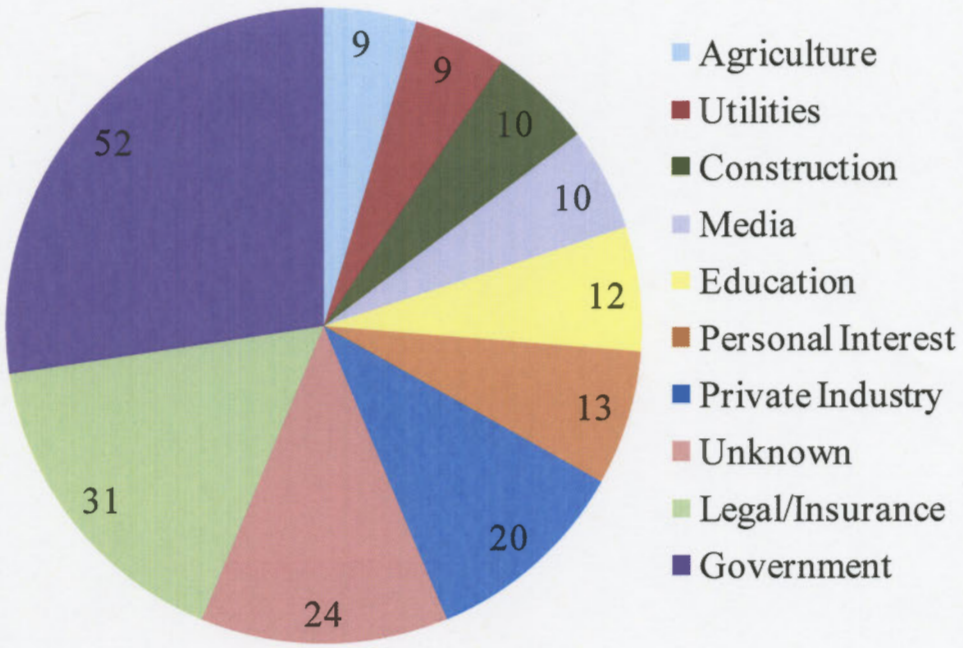

Figure 1: Number of customers from each Stakeholder Group, N=190

The survey respondent's climate sensitive decision implications (Question 1 and 2) are presented in Figure 2. Stakeholders use climate information for a wide range of decisions. Twenty-three percent of requests were used to inform legal proceedings. Unfortunately for eighteen-percent of the survey assessments staff did not designate the decision need or implication. Thirteen percent of stakeholders were interested in information related to severe weather and tropical awareness. Another thirteen percent stated the climate information they

requested was a factor in determining the reliability of equipment, infrastructure or design. The remaining 32% of the requests were for a diverse range of decisions such as financial, agriculture, water resources, estimating delays to maintenance or construction activities, emergency response and degree of resilience under changing climate conditions.

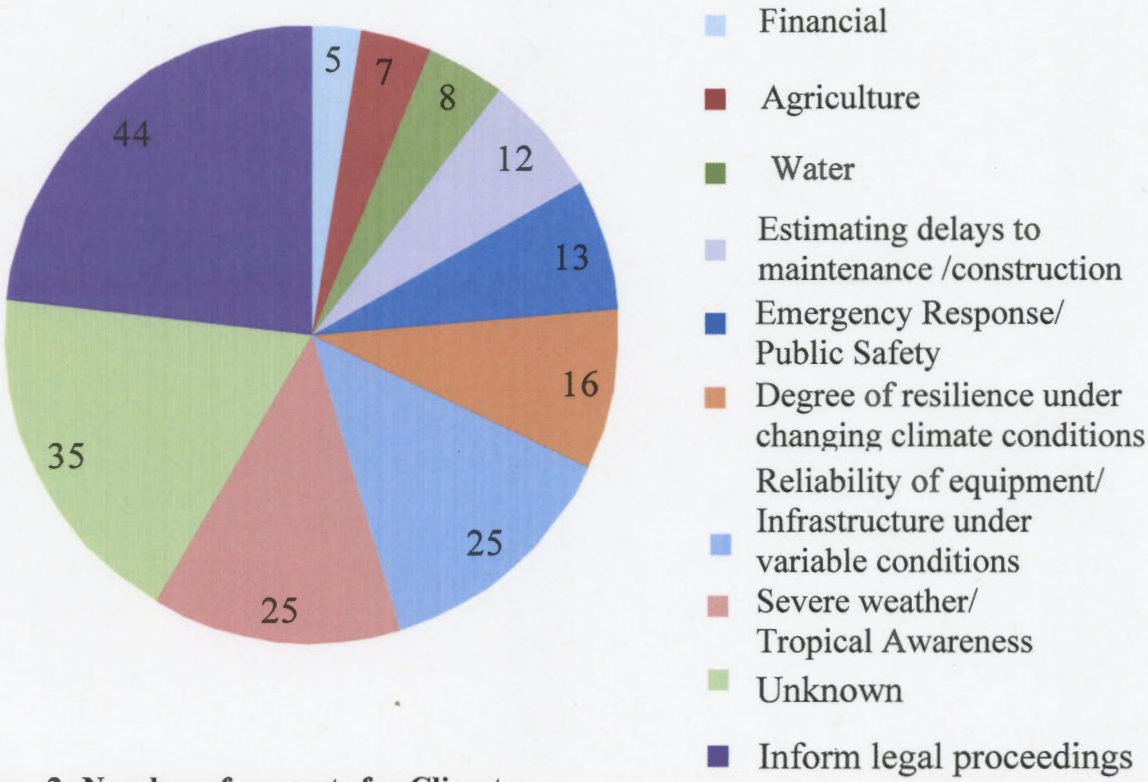

Figure 2: Number of requests for Climate Sensitive Decisions, N-190

Seventy-two percent of the clients responded that they did not perform additional processing to the data received from the SCO (Question 7 and Question 8). This percentage seems extremely high and may be an indication that the survey question is not worded correctly. The goal of the question was to gain a better understanding of the client's capacity for using the climate data. When specifically asked whether the climate data was used as input into applications, models (i.e ecological, hydrological, etc.) or in a Geographic Information System,

only 10% responded that they perform additional data processing in-house, but did not give specific examples. The remaining 18% were not designated.

A key reason for conducting these climate service assessments is to identify how or if organizations are planning for "climate change" and their adaptive capacity in order to prioritize future climate science investments. The survey questions were worded to address whether the customer integrates risks from climate variability into their decisions and planning (Question 9 and Question 10). Twenty percent of the survey respondents interviewed by the SCO indicate they currently (or plan to within the next year) conduct planning that integrates climate variability. Their decision planning needs (N=36) that incorporate climate change and variability information are consolidated into categories and presented in Table 1. The length of their planning horizon ranged from 5 to 30 years (Question 10).

Table 1: SCO customers' decision and planning needs that incorporate climate change and variability information

Streamflow and Sea Level Change	Public safety
Rural development	Fishery mortality
Storm frequency (winter weather, tropical, severe)	Ocean temperatures
Planting and harvesting	Climate extremes
Financial planning	Trends
Rate scheduling	Reliability of water resources (specifically drought)

Another survey goal was to determine whether the SCO is meeting the stakeholder needs and what additional climate science service the office should provide. Since the beginning of the survey in September 2010 the office was unable to answer only 4 requests. Two of these requests were for General Circulation Model (GCM) downscaled data at the county level which

is not yet available. The other two requests were from fire departments for hydroclimatological trend studies to determine the reliability of their water sources during droughts. These requests were referred to a consultant to perform the necessary site-specific calculations. The small number of requests the office could not answer indicates that the SCO is currently meeting its customer needs and that these customers do not yet request climate change projections (or downscaled data), but depend on the SCO to provide basic climate data, temperature and precipitation trends, and storm and drought frequency information.

SCDNR Climate Change Impact's to Natural Resources Document Management System

This section discusses the document plan, schema and process work flow for the SCDNR Climate Change Document Management System Library (CCDMS). The online CCDMS provides a unified repository to manage the agency's climate change resources and content. The CCDMS stores electronic documents related to climate change and natural resources in a central location . In order for the SCDNR Technology Development section to design the structure of the CCDMS a document management plan was created that outlined the types of information to be stored and the search criteria for querying and retrieving the documents. The document types to be included are articles, data, presentations, meeting minutes, training, photographs and funding. These documents will also be stored by data type, funding source and how the document is related to the agency's priorities to address climate change impacts to natural resources. Figure 3 provides a flow chart (The Memory Jogger II, 1994) identifying how information will be stored, indexed and retrieved from the CCDMS. Documents that are not in an electronic format will be scanned using imaging software. Appendix 2 displays a draft design for the intranet site. The full website is under development by the SCDNR Technology Development section through coordination with the SCDNR-CCTWG.

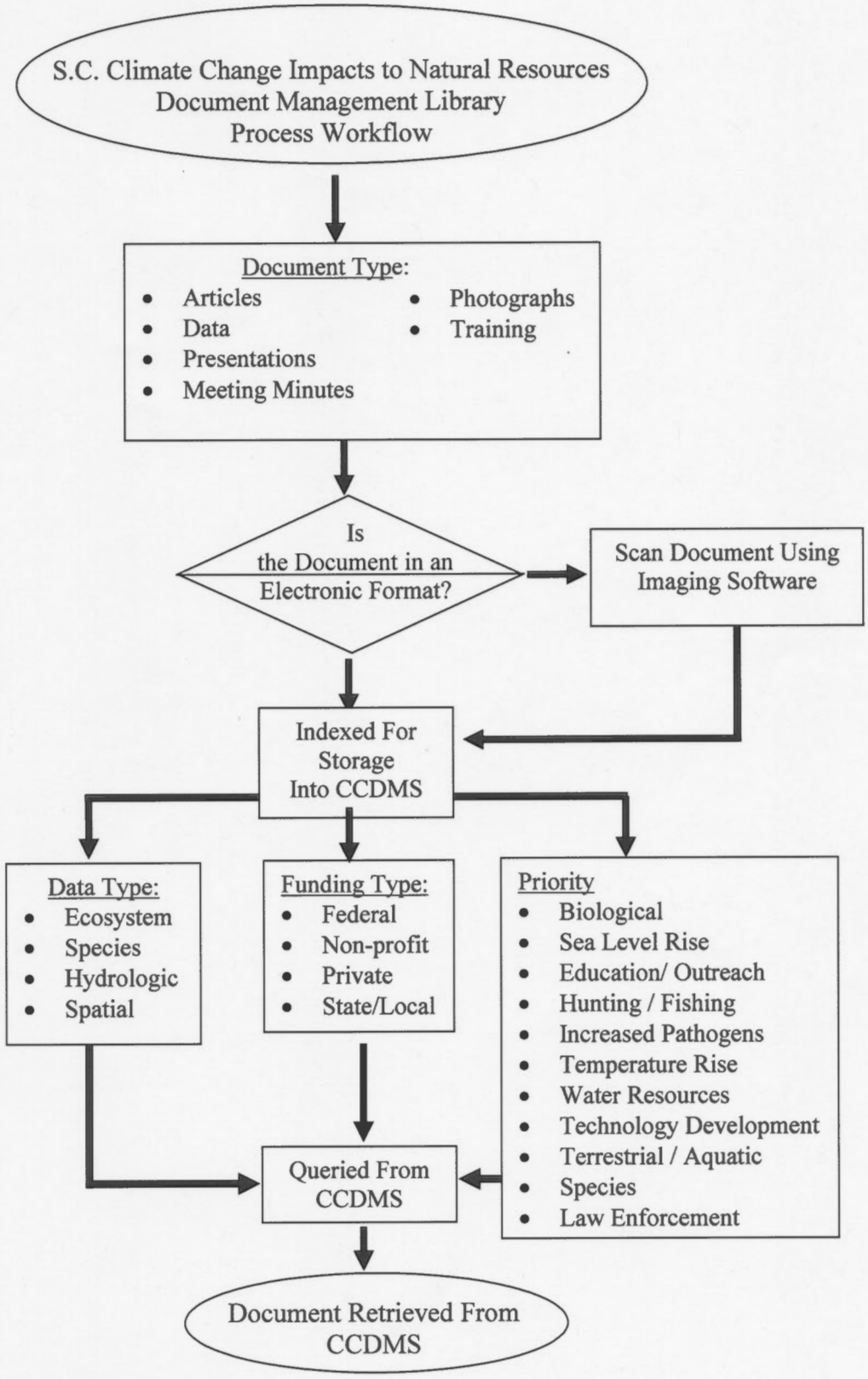

Figure 3: Document Management Library Process Workflow

IV. Implementation and Evaluation

Climate Service Survey

This section will discuss an implementation plan for integration of the client assessment survey into the SCO's standard operating procedure. The 190 customer assessments completed provided valuable information about the stakeholder type and climate sensitive decision needs. It provided some insight into their capacity to use the data and their level of planning for future climate variability. Most importantly, it helped validate that the SCO should routinely maintain a climate request management system to evaluate the SCO's effectiveness in providing climate services. The survey process completed for the CPM project helped identify question inadequacies and the need for survey training to insure consistency among the staff in conducting the survey.

Results from the CPM project have been used to assist in the implementation of a broader effort by State Climatologists in the Southeast region, the Southeast Regional Climate Center and CISA to conduct client assessments (funding to SCDNR provided by National Oceanic and Atmospheric Administration (NOAA) CISA Regional Assessment Subaward, 2011). Lessons learned from the SCO experience have provided guidance and been incorporated into this regional effort. The end result will be a secure online climate request management application/database that will be utilized by State Climatologists in the Southeast region for documenting requests. The online tool is under development by the North Carolina State Climatology Office through funding from the NOAA CISA Regional Assessment grant. Since the online tool will be used by seven offices additional funds should be pursued to develop staff training to ensure that the survey is conducted consistently. Conducting surveys is not an exact science and some questions may have different interpretations depending on the interviewer's perspective.

SCDNR Climate Change Impact's to Natural Resources Document Management System

This section will discuss action steps needed for SCDNR's operational execution of the CCDMS. Implementation of the CCDMS will directly benefit the agency as it finalizes the report entitled "Climate Change Impacts to Natural Resources in South Carolina" and pursues agency priorities to address climate change. Consultation with the SCDNR CCTWG and the SCDNR Technology Development Section has been completed to determine the CCDMS schema that will enable the most efficient document storage and retrieval. The next steps include online implementation, initial testing and evaluation by the SCDNR TWG, training and full-scale operation. After the SCDNR TWG performs the initial testing by entering and retrieving documents, training will be offered around the state for key SCDNR personnel. Training on the CCDMS will be held in conjunction with in-house workshops already planned to initiate the agency's priorities for addressing climate change impacts to natural resources. The success of the CCDMS depends on staff participation. The CCDMS trainings will emphasize that entering documents into this centralized climate change inventory will assist the agency in addressing many of the existing natural resource concerns. Routine webinars will be conducted to communicate the agency's progress in addressing climate change and to encourage staff to utilize the CCDMS.

V. Summary and Recommendations

The final section summarizes key findings from the two CPM project components and provides recommendations for future actions.

Climate Service Survey

The systematic procedure to identify and document the nature and scope of requests was successful in identifying the SCO's stakeholders and how they are integrating climate

information into their day-to-day operations as well as their long-term plans. The CPM project established a necessary process to track constituent needs and the office's ability to provide climate services. The project validated that climate information continues to be utilized by decision makers on shorter time scales because it is more relevant to short-term planning and management decisions. Decision makers require interpretation of climate information and assistance in understanding the application of that information. The project revealed a growing opportunity for the office to provide longer-term climate variability and climate change information within the constituents' existing issues. The office can provide climate services that bridge the gap between their current climate needs and implications of a changing climate on their decisions.

Potential inconsistencies in how staff completes the user survey should be resolved through training and fact sheets. Staff should evaluate each question in the survey to identify ways to consolidate the number of questions to lessen the burden on the constituent while gathering the most pertinent information about their needs and the office's ability to provide climate services. It is hoped this will increase the ratio of surveys completed compared to total number of requests received and lower the number of survey questions left blank. The development of the regional online tool provides an ideal opportunity to work with other State Climate Offices in the Southeast, the Carolina's RISA and the Southeast Regional Climate Center to systematically evaluate climate user needs and collectively provide more efficient climate service in the region.

SCDNR Climate Change Impacts to Natural Resources Document Management System

The SCDNR Climate Change Impacts to Natural Resources Document Management System provides a unified repository to manage the agencies electronic documents related to climate change and natural resources. The CCDMS allows staff to store, organize, and locate documents, ensure document consistency, and manage metadata. Training on the CCDMS will be held in conjunction with in-house workshops already planned to initiate the agency's priorities to address climate change impacts to natural resources. The CCDMS will enhance efforts to integrate climate change into the agency's organizational culture, its structure and natural resource management strategies.

VI. References

A Climate Services Vision: First Steps Toward the Future, National Academy of Sciences, Board on Atmospheric Sciences and Climate, National Research Council, 96, 2001.

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Changnon, S. The Past and Future of Climate-Related Services in the United States, Journal of Service Climatology, 1(1), 1-6, 2008.

Dow, K., Carbone, G., Tufford, D., Boyles, R., Konrad, C., Mizzell, H., Supporting Regional Assessment Services in the Carolinas and Southeast, NOAA Regional Integrated Science and Assessment Project Proposal, 2010.

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Appendix 1

South Carolina Department of
Natural Resources

DNR

Climate Service Questionnaire

BACKGROUND

Date: _____

Name:

_____

Sector:

_____

Type of Organization

Agriculture,	Construction,	Economic Development,
Legal/Insurance,	Library,	Media
Personal Interest,	Private Industry,	Utilities
Government:	Local, State, Federal	
Education:	K-12	College

Name of organization:

_____

Format of Request: phone letter email other: _____

Charge: _____

Unable to Assist Customer: Yes No

Reason:

_____

_____

Referred To:

WHAT ARE THE CURRENT CLIMATE-SENSITIVE DECISIONS?

1. What is the decision you need to make?

2. What are the implications of the decision?
   - □ Financial, approx. $ _____
   - □ Severe Weather /Tropical Awareness
   - □ Inform Legal Proceedings
   - □ Estimating delays to maintenance or construction activities
   - □ Reliability of equipment/infrastructure/design under variable conditions
   - □ Degree of resilience under changing climate conditions
   - □ Other –

3. Is this a ☐ recurring or a ☐ one-time question?

4. Decision calendar – is there a date by which you need to make this decision?

   ☐ No ☐ Yes, _____

5. The decision deadline is determined by a

   ☐ internal planning process ☐ insurance deadline

   ☐ permit or regulatory deadline ☐ deadline for advance orders of inventory

   ☐ Other _____

CAPACITY WITH CLIMATE INFORMATION

6. How did you find out about our services?

   ☐ Website ☐ Referral ☐ NWS ☐ Other: _____

7. Is additional processing needed to use data received from SCO?

   ☐ Yes ☐ No

   If yes,

   ☐ add to a GIS project ☐ alter units or time scales

☐ format to import to another model for _____
[purpose, e.g. runoff modeling]
Name of model_____

☐ other

8. Who does the additional processing?

☐ in house staff

☐ by a consultant

☐ we are working on behalf of clients in _____ sector

CLIMATE CHANGE INFORMATION NEEDS

9. Do you or your organization do any planning that integrates risks from climate variability?

☐ Yes ☐ No ☐ Expect to begin in the coming year

If yes, what are the planning goals or decisions being addressed?

10. Do you have any need for climate variability information for this planning process/decision?

☐ Yes ☐ No

If yes,

What parameters are needed? _____

What is the planning horizon? (5 years, 10 years, 30 years) _____

What spatial scale would be most useful? _____ km grid

What is the maximum spatial scale that could be helpful? _____ km grid

****

Appendix 2


Life's Better
Outdoors
South Carolina Department of Natural Resources
DNR
Site map | SCDNR Home
Buy
Boating
Education
Fishing
Hunting
Land
Regulations
Water
Wildlife
Information
Bulletin Board
Contact Directory
Data Resources
Documents
Events
Funding Resources
Related Links
Tools
Climate Change Document Library
Search Library
Search by Category
Document Type:
Articles
Data
Photographs
Presentation
Meeting Minutes
Reports
Training
Data Type:
Ecosystem
Spatial Data
Species
Water Resources
Funding Type:
Federal Grants
Non-profit
Private
State/Local Grants
Topic:
Biological Resulting Effects
Change in Sea Level
Education & Outreach
Hunting & Fishing Impacts
Increased Pathogens
Law Enforcement Impacts
Potential Temperature Rise
Related Effect to Water Resources
Technologies Development
Terrestrial & Aquatic Habitats
Related Effect to Species